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Consumer Factsheet on: NITRATES/NITRITES

List of Contaminants

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:
National Primary Drinking Water Regulations

This is a factsheet about a chemical that may be found in some public or private drinking water supplies. It may cause health problems if found in amounts greater than the health standard set by the United States Environmental Protection Agency (EPA).

What are Nitrates/Nitrites and how are they used?

Nitrates and nitrites are nitrogen-oxygen chemical units which combines with various organic and inorganic compounds. Once taken into the body, nitrates are converted into nitrites. The greatest use of nitrates is as a fertilizer.

Why are Nitrates/Nitrites being regulated?

In 1974, Congress passed the Safe Drinking Water Act. This law requires EPA to determine safe levels of chemicals in drinking water which do or may cause health problems. These non-enforceable levels, based solely on possible health risks and exposure, are called Maximum Contaminant Level Goals.

The MCLG for nitrates has been set at 10 parts per million (ppm), and for nitrites at 1 ppm, because EPA believes this level of protection would not cause any of the potential health problems described below.

Based on this MCLG, EPA has set an enforceable standard called a Maximum Contaminant Level (MCL). MCLs are set as close to the MCLGs as possible, considering the ability of public water systems to detect and remove contaminants using suitable treatment technologies.

The MCL for nitrates has been set at 10 ppm, and for nitrites at 1 ppm, because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

These drinking water standards and the regulations for ensuring these standards are met, are called National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

What ar th h alth eff cts?

Short-term: Excessive levels of nitrate in drinking water have caused serious illness and sometimes death. The serious illness in infants is due to the conversion of nitrate to nitrite by the body, which can interfere with the oxygen-carrying capacity of the childs blood. This can be an acute condition in which health deteriorates rapidly over a period of days. Symptoms include shortness of breath and blueness of the skin.

Long-term: Nitrates and nitrites have the potential to cause the following effects from a lifetime exposure at levels above the MCL: diuresis, increased starchy deposits and hemorrhaging of the spleen.

How much Nitrates/Nitrites are produced and released to the environment?

Most nitrogenous materials in natural waters tend to be converted to nitrate, so all sources of combined nitrogen, particularly organic nitrogen and ammonia, should be considered as potential nitrate sources. Primary sources of organic nitrates include human sewage and livestock manure, especially from feedlots.

The primary inorganic nitrates which may contaminate drinking water are potassium nitrate and ammonium nitrate both of which are widely used as fertilizers.

According to the Toxics Release Inventory, releases to water and land totaled over 112 million pounds from 1991 through 1993. The largest releases of inorganic nitrates occurred in Georgia and California.

What happens to Nitrates/Nitrites when they are released to the environment?

Since they are very soluble and do not bind to soils, nitrates have a high potential to migrate to ground water. Because they do not evaporate, nitrates/nitrites are likely to remain in water until consumed by plants or other organisms.

How will Nitrates/Nitrites be detected in and removed from my drinking water?

The regulation for nitrates/nitrites became effective in 1992. Between 1993 and 1995, EPA required your water supplier to collect water samples at least once a year and analyze tem to find out if nitrates/nitrites are present above 50 percent of their MCLs. If it is present above this level, the system must continue to monitor this contaminant every 3 months.

If contaminant levels are found to be consistently above their MCLs, your water supplier must take steps to reduce the amount of nitrates/nitrites so that they are consistently below that level. The following treatment methods have been approved by EPA for removing nitrates/nitrites: Ion exchange, Reverse Osmosis, Electrodialysis.

How will I know if Nitrates/Nitrit s ar in my drinking wat r?

If the levels of nitrates/nitrites exceed their MCLs, the system must notify the public via newspapers, radio, TV and other means. Additional actions, such as providing

alternative drinking water supplies, may be required to prevent serious risks to public health.

Drinking Water Standards (ppm): MCLG MCL

Nitrate:	**10**	**10**
Nitrite:	**1**	**1**

Nitrate and Nitrite Releases to Water and Land: 1991 to 1993 (in pounds)

	Water	Land
TOTALS	**59,014,378**	**53,134,805**

Top Fifteen States*		
GA	12,114,253	12,028,585
CA	0	21,840,999
AL	3,463,097	6,014,674
LA	8,778,237	2,250
MO	6,985,890	206,181
MS	6,952,387	0
KS	5,140,000	877,095
VA	5,091,764 0	
NV	0	4,977,482
FL	1,056,560	1,835,736
AR	1,206,610	1,058,294
MD	1,802,219	138,819
IA	1,500,340	132,042
OK	1,436,348	14,199
UT	0	1,045,400

Major Industries*		
Nitrogenous fertilizer	41,584,611	8,607,376
Misc. Ind. inorganics	4,113,312	29,676,919
Misc. Metal ores	0	5,764,976
Misc. Ind. organics	5,091,764	0
Fertilizer mixing	480,000	4,554,916
Explosives	850,921	1,297,590
Paper mills	1,727,061	0
Pulp mills	1,321,500	3,350
Canned foods	0	1,056,794
Phosphate fertilizers	1,000,000	0

* State/Industry totals only include facilities with releases greater than 10,000 lbs.

Learn more about your drinking water!

EPA strongly encourages people to learn more about their drinking water, and to support local efforts to protect and upgrade the supply of safe drinking water. Your water bill or telephone books government listings are a good starting point.

Your local water supplier can give you a list of the chemicals they test for in your water, as well as how your water is treated.

Your state Department of Health/Environment is also a valuable source of information.

For help in locating these agencies or for information on drinking water in general, call: EPAs Safe Drinking Water Hotline: (800) 426-4791.

For additional information on the uses and releases of chemicals in your state, contact the: Community Right-to-Know Hotline: (800) 535-0202.

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publications

Summary of Report

Benefits of Safer Drinking Water: The Value of Nitrate Reduction

AER-752, June 1997

Contact: Stephen R. Crutchfield, 202-694-5460.

Consumers would be willing to pay $45 to $60 per household per month for a filter that reduced nitrates in drinking water to levels considered safe, if their drinking water exceeded the EPA minimum safety standard. Additional findings from a survey conducted in four regions of the United States showed that respondents would pay from $45 to $70 per month for a filter that would render their drinking water totally nitrate-free.

Ground water is an important source of drinking water, especially in rural areas. During the past 15 years, considerable public interest has arisen about the quality of the Nation's ground water resources. This is especially true for agricultural chemical residuals, which may potentially degrade ground water quality. Concern about agricultural sources of ground water contamination is driven by fears that exposure to agricultural chemicals in drinking water may pose human health risks.

The objective of this report was to use applied microeconomic models to evaluate the potential benefits of reducing or eliminating nitrates from drinking water. The more than 800 persons surveyed in 1994 lived in four regions: the White River area of Indiana, Central Nebraska, the Lower Susquehanna River Valley, and the Mid-Columbia Basin in Washington.

After being given a description of possible nitrate risks, and being asked to assume that their water supply contained nitrates above levels considered safe, respondents were asked if they would pay a randomly selected dollar amount for a water filter to lower nitrates to safe levels. Then they were asked if they would pay a higher dollar amount for a filter that would eliminate all nitrates from their drinking water.

Potential benefits for the 2.9 million households in the four study regions were estimated at $350 million, if households potentially at risk were protected from excessive nitrates in the drinking water.

Discovery of nitrates and pesticides in ground water during the late 1970's and early

1980's dispelled the commonly held view that ground water was protected from these chemicals by layers of rock, soil, and clay. In 1990, the U.S. Environmental Protection Agency (EPA) released results from a survey showing that, while at least half of the Nation's drinking water wells contained detectable amounts of nitrate, only about 1.2 percent of community water systems and 2.4 percent of rural wells contained nitrates at levels higher than EPA recommendations (10 mg/liter).

The Environmental Working Group estimates that two million people drank water from systems that violated the EPA nitrate standard at least once between 1986 and 1995. An additional estimated 3.8 million people drank water from private wells with nitrate levels above the 10 mg/liter standard.

The extent to which drinking water contamination from agricultural chemicals poses a risk to human health is unclear. A well-documented nitrate contamination concern is infant methemoglobinemia, in which nitrates impair the ability of an infant's blood to carry oxygen. Nitrates in water and foods (such as hot dogs) have also been suggested as possible sources of cancer. However, the health risk of water containing traces of nitrates at levels below those that possibly endanger humans is poorly understood.

 The full report is in Adobe Acrobat PDF format. You can download and get help using the Adobe Acrobat Reader to view and print the document. PDF format is used to preserve the layout as it appears in the printed publication.

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